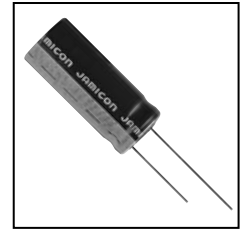


- High temperature 105°C and high reliability



## SPECIFICATION

| Item   | Characteristic  |  |      |      |      |  |        |         |         |      |              |      |      |      |      |
|--|---|--|------|------|------|--|--------|---------|---------|------|--------------|------|------|------|------|
| Operation Temperature Range                        | -55 ~ +105°C  |  |      |      |      | -40 ~ +105°C                                 |        |         |         |      | -25 ~ +105°C |      |      |      |      |
| Rated Working Voltage                              | 6.3 ~ 100VDC  |  |      |      |      | 160 ~ 400VDC                                 |        |         |         |      | 450VDC       |      |      |      |      |
| Capacitance Tolerance (120Hz 20°C)                 | ±20%(M)   |  |      |      |      |  |        |         |         |      |              |      |      |      |      |
| Leakage Current<br>(20°C)                          | 6.3~100 VDC $I \leq 0.01CV$ or $4 (\mu A)$  |  |      |      |      | 160~450 VDC $I \leq 0.03CV + 40 (\mu A)$ max |        |         |         |      |              |      |      |      |      |
|  | *Whichever is greater after 3 minutes<br>I : Leakage Current( $\mu A$ ) C : Rated Capacitance( $\mu F$ ) V : Working Voltage(V)               |  |      |      |      |  |        |         |         |      |              |      |      |      |      |
| Surge Voltage<br>(20°C)                            | W.V.  | 6.3  | 10   | 16   | 25   | 35   | 50     | 63      | 100     | 160  | 200          | 250  | 350  | 400  | 450  |
|  | S.V.  | 8  | 13   | 20   | 32   | 44   | 63     | 79      | 125     | 200  | 250          | 300  | 400  | 450  | 500  |
| Dissipation Factor (tan $\delta$ )<br>(120Hz 20°C) | Add 0.02 per 1000 $\mu F$ for more than 1000 $\mu F$  |  |      |      |      |  |        |         |         |      |              |      |      |      |      |
|  | W.V.  | 6.3  | 10   | 16   | 25   | 35   | 50     | 63      | 100     | 160  | 200          | 250  | 350  | 400  | 450  |
|  | tan $\delta$  | 0.24   | 0.20 | 0.17 | 0.15 | 0.12   | 0.10   | 0.10    | 0.08    | 0.15 | 0.15         | 0.15 | 0.20 | 0.20 | 0.20 |
| Low Temperature Stability                          | Impedance ratio at 120Hz  |  |      |      |      |  |        |         |         |      |              |      |      |      |      |
|  | Rated Voltage (V)   | 6.3  |      | 10   | 16   | 25   | 35~100 | 160~250 | 350~400 | 450  |              |      |      |      |      |
|  | -25°C / +20°C   | 4  |      | 3    | 2    | 2  | 2      | 3       | 6       | 15   |              |      |      |      |      |
|  | -40°C / +20°C   | 10   |      | 8    | 6    | 4  | 3      | 4       | 10      | —    |              |      |      |      |      |
| Load Life  | After 2000 hours application of W.V. at +105°C, the capacitor shall meet the following limits.  |  |      |      |      |  |        |         |         |      |              |      |      |      |      |
|  | Capacitance Change  | $\leq \pm 25\%$ of initial value for 6.3~16 W.V., $\leq \pm 20\%$ of initial value for 25~450 W.V. |      |      |      |  |        |         |         |      |              |      |      |      |      |
|  | Dissipation Factor  | $\leq 200\%$ of initial specified value  |      |      |      |  |        |         |         |      |              |      |      |      |      |
|  | Leakage current   | $\leq$ initial specified value   |      |      |      |  |        |         |         |      |              |      |      |      |      |
| Shelf Life   | At +105°C no voltage application after 1000 hours the capacitor shall meet the limits for load life characteristics. (with voltage treatment) |  |      |      |      |  |        |         |         |      |              |      |      |      |      |

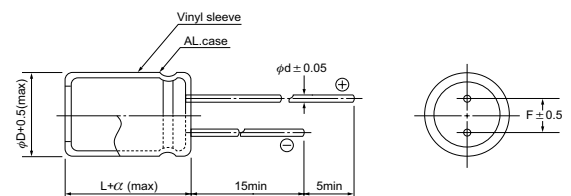
## DIMENSIONS (mm)

| $\phi D$ | 5   | 6.3 | 8   | 10  | 12.5 | 16  | 18  | 20   | 22   | 25   |
|----------|-----|-----|-----|-----|------|-----|-----|------|------|------|
| F        | 2.0 | 2.5 | 3.5 | 5.0 | 5.0  | 7.5 | 7.5 | 10.0 | 10.0 | 12.5 |
| d        | 0.5 | 0.5 | 0.6 | 0.6 | 0.6  | 0.8 | 0.8 | 0.8  | 1.0  | 1.0  |
| $\alpha$ | 1.5 | 1.5 | 1.5 | 1.5 | 1.5  | 1.5 | 1.5 | 2.0  | 2.0  | 2.0  |

## RIPPLE CURRENT COEFFICIENTS

| Temperature(°C) | 65   | 85   | 105  |
|-----------------|------|------|------|
| Multiplier      | 1.75 | 1.40 | 1.00 |

| Frequency(Hz) | 60         | 120  | 1k   | $\geq 10k$ |
|---------------|------------|------|------|------------|
| W.V.          | Multiplier |      |      |            |
| 6.3~25V       | 0.85       | 1.00 | 1.10 | 1.20       |
| 35~100V       | 0.80       | 1.00 | 1.15 | 1.25       |
| 160~250V      | 0.75       | 1.00 | 1.25 | 1.40       |
| 350~450V      | 0.70       | 1.00 | 1.30 | 1.80       |



● CASE SIZE & MAX RIPPLE CURRENT

Case size : D x L (mm)  
 Max ripple current : mA(rms) 105°C 120Hz

| μF    | V(Code) |      | 6.3 (0J) |      | 10 (1A) |      | 16 (1C) |      |
|-------|---------|------|----------|------|---------|------|---------|------|
|       | Code    | Item | DxL      | R.C. | DxL     | R.C. | DxL     | R.C. |
| 47    | 470     |      |          |      |         | →    | 5x11    | 75   |
| 100   | 101     |      | 5x11     | 95   | 5x11    | 100  | 5x11    | 110  |
| 220   | 221     |      | 5x11     | 140  | 5x11    | 150  | 6.3x11  | 190  |
| 330   | 331     |      | 6.3x11   | 200  | 6.3x11  | 210  | 8x11.5  | 270  |
| 470   | 471     |      | 6.3x11   | 230  | 6.3x11  | 260  | 8x11.5  | 320  |
| 1000  | 102     |      | 8x11.5   | 400  | 10x12.5 | 460  | 10x16   | 550  |
| 2200  | 222     |      | 10x16    | 660  | 10x20   | 790  | 12.5x20 | 910  |
| 3300  | 332     |      | 10x20    | 860  | 12.5x20 | 990  | 12.5x25 | 1170 |
| 4700  | 472     |      | 12.5x20  | 1040 | 12.5x25 | 1230 | 16x25   | 1310 |
| 6800  | 682     |      | 12.5x25  | 1300 | 16x25   | 1390 | 16x31.5 | 1620 |
| 10000 | 103     |      | 16x25    | 1450 | 16x35.5 | 1780 | 18x35.5 | 1970 |
| 15000 | 153     |      | 16x35.5  | 1860 | 18x35.5 | 2060 | 20x40   | 2210 |
| 22000 | 223     |      | 18x40    | 2250 | 20x40   | 2460 | 22x50   | 2940 |
| 33000 | 333     |      | 22x50    | 2950 | 22x50   | 3020 | 25x50   | 3300 |

All blank voltage on sleeve marking is the same voltage as" → "point to.

| μF    | V(Code) |      | 25 (1E) |      | 35 (1V) |      | 50 (1H) |      |
|-------|---------|------|---------|------|---------|------|---------|------|
|       | Code    | Item | DxL     | R.C. | DxL     | R.C. | DxL     | R.C. |
| 0.1   | 0R1     |      |         |      |         | →    | 5x11    | 5    |
| 0.22  | R22     |      |         |      |         | →    | 5x11    | 7    |
| 0.33  | R33     |      |         |      |         | →    | 5x11    | 8    |
| 0.47  | R47     |      |         |      |         | →    | 5x11    | 10   |
| 1     | 010     |      |         |      |         | →    | 5x11    | 15   |
| 2.2   | 2R2     |      |         |      |         | →    | 5x11    | 22   |
| 3.3   | 3R3     |      |         |      |         | →    | 5x11    | 27   |
| 4.7   | 4R7     |      |         |      |         | →    | 5x11    | 32   |
| 10    | 100     |      | 5x11    | 38   | 5x11    | 42   | 5x11    | 46   |
| 22    | 220     |      | 5x11    | 55   | 5x11    | 65   | 5x11    | 70   |
| 33    | 330     |      | 5x11    | 70   | 5x11    | 75   | 5x11    | 85   |
| 47    | 470     |      | 5x11    | 80   | 5x11    | 90   | 6.3x11  | 110  |
| 100   | 101     |      | 6.3x11  | 140  | 6.3x11  | 150  | 8x11.5  | 190  |
| 220   | 221     |      | 8x11.5  | 240  | 8x11.5  | 260  | 10x12.5 | 300  |
| 330   | 331     |      | 8x11.5  | 290  | 10x12.5 | 340  | 10x16   | 410  |
| 470   | 471     |      | 10x12.5 | 360  | 10x16   | 450  | 10x20   | 540  |
| 1000  | 102     |      | 10x20   | 650  | 12.5x20 | 770  | 12.5x25 | 930  |
| 2200  | 222     |      | 12.5x25 | 1060 | 16x25   | 1180 | 16x35.5 | 1480 |
| 3300  | 332     |      | 16x25   | 1240 | 16x35.5 | 1570 | 18x35.5 | 1790 |
| 4700  | 472     |      | 16x31.5 | 1520 | 18x35.5 | 1840 |         |      |
| 6800  | 682     |      | 18x35.5 | 1890 |         |      |         |      |
| 10000 | 103     |      | 20x40   | 2270 |         |      |         |      |
| 15000 | 153     |      | 22x50   | 2840 |         |      |         |      |
| 22000 | 223     |      | 25x50   | 3210 |         |      |         |      |

● CASE SIZE & MAX RIPPLE CURRENT

Case size : D x L (mm)  
 Max ripple current : mA(rms) 105°C 120Hz

| μF   | V(Code) |      | 63 (1J) |      | 100 (2A) |      |
|------|---------|------|---------|------|----------|------|
|      | Code    | Item | DxL     | R.C. | DxL      | R.C. |
| 0.1  | 0R1     |      |         | →    | 5x11     | 5    |
| 0.22 | R22     |      |         | →    | 5x11     | 8    |
| 0.33 | R33     |      |         | →    | 5x11     | 9    |
| 0.47 | R47     |      |         | →    | 5x11     | 11   |
| 1    | 010     |      |         | →    | 5x11     | 16   |
| 2.2  | 2R2     |      |         | →    | 5x11     | 24   |
| 3.3  | 3R3     |      |         | →    | 5x11     | 30   |
| 4.7  | 4R7     |      |         | →    | 5x11     | 35   |
| 10   | 100     |      | 5x11    | 46   | 6.3x11   | 55   |
| 22   | 220     |      | 5x11    | 70   | 6.3x11   | 85   |
| 33   | 330     |      | 6.3x11  | 95   | 8x11.5   | 120  |
| 47   | 470     |      | 6.3x11  | 110  | 10x12.5  | 160  |
| 100  | 101     |      | 10x12.5 | 200  | 10x20    | 280  |
| 220  | 221     |      | 10x16   | 340  | 12.5x25  | 490  |
| 330  | 331     |      | 10x20   | 460  | 12.5x25  | 600  |
| 470  | 471     |      | 12.5x20 | 580  | 16x25    | 720  |
| 1000 | 102     |      | 16x25   | 940  | 18x40    | 1380 |
| 2200 | 222     |      |         |      | 22x50    | 2260 |

All blank voltage on sleeve marking is the same voltage as" → "point to.

| μF   | V(Code) |      | 160 (2C) |      | 200 (2D) |      | 250 (2E) |      |
|------|---------|------|----------|------|----------|------|----------|------|
|      | Code    | Item | DxL      | R.C. | DxL      | R.C. | DxL      | R.C. |
| 0.47 | R47     |      | 6.3x11   | 9    | 6.3x11   | 10   | 6.3x11   | 11   |
| 1    | 010     |      | 6.3x11   | 14   | 6.3x11   | 15   | 6.3x11   | 16   |
| 2.2  | 2R2     |      | 6.3x11   | 20   | 6.3x11   | 22   | 6.3x11   | 24   |
| 3.3  | 3R3     |      | 6.3x11   | 25   | 6.3x11   | 26   | 8x11.5   | 34   |
| 4.7  | 4R7     |      | 6.3x11   | 29   | 8x11.5   | 37   | 8x11.5   | 40   |
| 10   | 100     |      | 8x11.5   | 50   | 10x12.5  | 55   | 10x16    | 70   |
| 22   | 220     |      | 10x16    | 85   | 10x20    | 100  | 12.5x20  | 120  |
| 33   | 330     |      | 10x20    | 120  | 12.5x20  | 130  | 12.5x20  | 150  |
| 47   | 470     |      | 12.5x20  | 150  | 12.5x20  | 160  | 12.5x25  | 190  |
| 100  | 101     |      | 12.5x25  | 240  | 16x25    | 260  | 16x31.5  | 310  |
| 220  | 221     |      | 16x35.5  | 420  | 18x40    | 510  |          |      |
| 330  | 331     |      | 18x40    | 580  |          |      |          |      |
| 470  | 471     |      | 22x40    | 770  |          |      |          |      |
| 1000 | 102     |      | 25x50    | 1330 |          |      |          |      |

| μF   | V(Code) |      | 350 (2V) |      | 400 (2G) |      | 450 (2W) |      |
|------|---------|------|----------|------|----------|------|----------|------|
|      | Code    | Item | DxL      | R.C. | DxL      | R.C. | DxL      | R.C. |
| 0.47 | R47     |      | 8x11.5   | 11   | 8x11.5   | 11   | 10x12.5  | 11   |
| 1    | 010     |      | 8x11.5   | 16   | 8x11.5   | 16   | 10x12.5  | 17   |
| 2.2  | 2R2     |      | 8x11.5   | 24   | 10x12.5  | 26   | 10x20    | 30   |
| 3.3  | 3R3     |      | 10x12.5  | 30   | 10x12.5  | 31   | 12.5x20  | 40   |
| 4.7  | 4R7     |      | 10x12.5  | 36   | 10x16    | 42   | 12.5x20  | 47   |
| 10   | 100     |      | 10x20    | 65   | 12.5x20  | 70   | 16x25    | 75   |
| 22   | 220     |      | 12.5x25  | 110  | 12.5x25  | 120  | 16x31.5  | 130  |
| 33   | 330     |      | 16x25    | 140  | 16x31.5  | 160  | 18x35.5  | 170  |
| 47   | 470     |      | 16x35.5  | 190  | 18x35.5  | 210  |          |      |
| 100  | 101     |      | 18x40    | 320  | 20x40    | 350  |          |      |
| 220  | 221     |      | 22x50    | 580  |          |      |          |      |